

2004 P04056

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(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
25 May 2001 (25.05.2001)

PCT

(10) International Publication Number  
WO 01/37526 A1

(51) International Patent Classification<sup>7</sup>: H04M 1/725, H04Q 7/28, H04M 1/247

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW.

(21) International Application Number: PCT/US00/31806

(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

(22) International Filing Date:  
17 November 2000 (17.11.2000)

Published:

- With international search report.
- Before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments.

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
09/443,783 19 November 1999 (19.11.1999) US

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

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(54) Title: SYSTEM AND METHOD FOR PROVIDING PUSH-TO-TALK FEATURE FOR WIRELESS COMMUNICATION SYSTEMS

Select Push-to-talk  
mode

30C

Re-configure  
input mechanism  
for PTT operation

3C

(57) Abstract: A method and apparatus for providing push-to-talk functionality to a conventional telephone. An existing key or switch located on a conventional telephone is selected to act as a push-to-talk switch. When a push-to-talk mode of operation is entered, the preselected key or switch is reconfigured to act as a push-to-talk switch. When the preselected key or switch is pressed while the telephone is in the push-to-talk mode, transmission from the telephone is enabled, allowing a user to transmit information to one or more entities. Transmission generally occurs for as long as the preselected key or switch is pressed. When the preselected key is released, the telephone is disabled from transmitting information.

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## SYSTEM AND METHOD FOR PROVIDING PUSH TO TALK FEATURE WIRELESS COMMUNICATION SYSTEMS

### BACKGROUND OF THE INVENTION

5

#### I. Field of the Invention

The present invention pertains generally to the field of wireless communications, and more specifically a method and apparatus for 10 providing push-to-talk functionality to a conventional telephone.

#### II. Background

The field of wireless communications has experienced tremendous 15 growth in the past several years. Cellular telephones have become commonplace, as consumers have embraced the idea of wireless communications. Millions of phones have been manufactured and sold to consumers to date.

A conventional wireless telephone typically comprises a keypad for 20 entering information into the telephone, and a display for allowing a user to see the entries that have been made, or to view information that may be transmitted to the wireless telephone from a remote source. Many wireless telephones have at least one key or switch on one side of the telephone housing, allowing additional functionality. This switch typically controls a 25 number of telephonic functions including ringer volume, earpiece volume, and other functions, often through the use of an electronic menu which is viewed on the display. This switch can take many forms, including a toggle switch, rocker switch, or a shuttle dial switch, the latter being a rotatable dial switch in combination with a push switch.

Recently, wireless telephones have been developed which offer 30 communications on a "one-to-many" basis, mimicking walkie-talkies or conventional LMR dispatch radios. Typically, a group of users, or net, is predefined. Each user or member of the net may transmit to any and all net members simultaneously by pressing a push-to-talk switch located on his or 35 her wireless communication device. The push-to-talk switch is generally located on one side of the wireless telephone, allowing a user ergonomic control over the switch. To speak to other members of the net, the push-to-talk switch is pressed and held for the duration of the transmission. To listen to other net members, the push-to-talk switch is released.

Push-to-talk communications are becoming increasingly popular. However, a special wireless telephone having a push-to-talk switch must be purchased for use in group communication systems. Often, users already own one or more conventional wireless communication devices.

5 Therefore, it would be desirable for such users to convert their conventional telephones into a push-to-talk capable device, without having to incur the expense of purchasing a telephone with such capabilities.

## 10 SUMMARY OF THE INVENTION

10 The present invention is a method and apparatus for providing push-to-talk functionality to a conventional telephone. In an exemplary embodiment, an existing key or switch located on a conventional telephone is preselected to act as a push-to-talk switch. During a push-to-talk mode of 15 operation, when the preselected key or switch is pressed, transmission from the telephone is enabled, allowing a user to transmit information to one or more users. Transmission generally occurs for as long as the preselected key or switch is pressed. When the preselected key is released, the telephone is disabled from transmitting information.

20 Push-to-talk functionality is realized by enabling a push-to-talk mode on the telephone. In the exemplary embodiment, this is accomplished by accessing a menu on a telephone display using one or more existing keys or switches located on the telephone housing. When the push-to-talk mode has been entered, at least one preselected key or switch is reconfigured to act 25 as a push-to-talk switch. In a conventional telephone mode, the preselected key or switch is configured to operate a different function than the push-to-talk function which is enabled during the push-to-talk mode.

## 30 BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates a conventional telephone incorporating a preferred embodiment of the present invention;

FIG. 2 illustrates a functional block diagram detailing the functional components of the conventional telephone of FIG. 1; and

35 FIG. 3 is a flow diagram detailing the method of the present invention.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

5 The embodiments described herein are described with respect to a wireless communication device, specifically a wireless telephone. While the present invention is especially suited for the transmission of voice information using such a wireless telephone, it should be understood that the present invention may be employed in various other types of  
10 applications, such as the transmission of audio, video, and data using such devices as landline telephones, satellite telephones, computers, and various video devices.

15 FIG. 1 illustrates a conventional wireless telephone 100 as used in the preferred embodiment of the present invention. Interface mechanisms, or  
20 keys, 102 allow a user to interface with telephone 100, while display 104 allows the user to monitor the status and operation of telephone 100. For example, to place a conventional telephone call, that is, a call from one user to another user, a telephone number is typically entered into telephone 100 by a first user pressing keys 102 corresponding to the desired telephone number corresponding to a second user. Display 104 typically displays an integer corresponding to each key 102 that is pressed. After the desired telephone number has been entered into telephone 100, a key is pressed to  
25 initiate the call, shown in FIG. 1 as a "send" key. Audio information, typically in the form of human speech, is received by microphone 108 while audio information from the second user is broadcast through speaker 110.

30 Many wireless telephones today have at least one interface mechanism 106 located on a side of telephone 100 for controlling various functions related to the operation of telephone 100. For example, interface mechanism 106 may comprise a rocker switch, rotatable dial, or shuttle dial to control an electronic menu which can be displayed on display 104. Interface mechanism 106, in combination with the electronic menu, and/or other interface mechanisms 102, allows a user to control various functions of telephone 100, such as ringer type and volume, various security features, display features, operational features, voice mail features, and so on.

35 In accordance with a preferred embodiment of the present invention, at least one interface mechanism 102, 106, or both, are reconfigured to enable a push-to-talk function when a push-to-talk mode of operation is chosen. An additional menu selection is added to the electronic menu to allow a

user to choose a push-to-talk mode of operation. When the push-to-talk mode of operation is selected, the one or more interface mechanisms are reconfigured to act as a push-to-talk switch.

A push-to-talk mode of operation, otherwise known as group mode, 5 one-to-many mode, or net broadcast mode, typically allows a user to listen to one or more members of a communication net. A communication net is a defined list of people who are able to communicate simultaneously with each other, generally through a central station of some kind. The communication net may be predetermined, or it may be allow users to join 10 and leave the net at will. Each net member uses a push-to-talk capable telephone to transmit information to other net members. The net can be regulated or unregulated. In a regulated net, only one net member can transmit at any given time. Permission to transmit is granted generally by a central communication manager. In an unregulated net, otherwise known 15 as a conference bridge, more than one member may transmit to other net members at any given time, however, this often results in unintelligible reception to the users due to the interference between multiple simultaneous transmissions.

FIG. 2 is a functional block diagram of telephone 100 in accordance 20 with the teachings of the present invention. The functional blocks are shown for illustrative purposes to explain the present invention and, therefore, many of the other functions of a wireless telephone, which are well known in the art, have been omitted for clarity. Although FIG. 2 illustrates the basic functional elements of a wireless digital telephone, the 25 present invention is not intended to be limited to a wireless telephone, or to a specific modulation scheme, protocol, or standard.

Referring back to FIG. 2, during conventional operation of telephone 100, acoustic energy, most often in the form of human speech, is received by microphone 108, where it is converted into electrical energy in the form of 30 an analog waveform and provided to analog-to-digital (A/D) converter 200. A/D 200 receives the analog waveform and converts it into a digital representation, often in the form of a pulse coded modulated (PCM) digital signal. The digital signal is then provided to modulator 202, where the digital signal is modulated in accordance with the particular type of 35 transmission scheme in use. For example, modulator 202 could be a CDMA modulator, a TDMA modulator, an AMPS modulator, or any other modulator known in the art. The modulated digital signal is then provided

to RF transceiver 204, where it is upconverted to a very high frequency for transmission through antenna 206.

Transmissions to telephone 100 are received by antenna 206 and provided to RF transceiver 204 where the transmission is downconverted from a very high frequency to an intermediate frequency. The downconverted signal is then provided to demodulator 208, where the information signal, in digital form, is extracted from the signal provided by RF transceiver 204. The digitized information signal is then provided to digital-to-analog (D/A) converter 210, where the digitized signal is converted into an analog signal, suitable for speaker 212. Speaker 212 converts the analog electrical signal into acoustic energy which may be heard by a user. The audio output level from speaker 212 is typically only audible by placing speaker 212 in proximity to the user's ear. However, other speakers are available which broadcast audio information at much greater level so that the user can hear the audio information even if speaker 212 is not in direct proximity to the user's ear. In an alternative embodiment, telephone 100 could comprise two speakers 212, one for use during conventional telephone operation, where audio information is broadcast a relatively low output level, and another for use during a push-to-talk mode of operation, where audio information is broadcast at a relatively high output level.

The functions of the various blocks shown in FIG. 2 are generally coordinated by processor 214, although other configurations are certainly possible. Processor 214 is a generally a well-known digital computing device used in connection with a set of program instructions pre-stored in memory 216. Processor 214 generally controls the functions of each block shown in FIG. 2, although each functional element could have its own processor, memory, and instruction set for performing specific operations of telephone 100. Processor 214 is controlled by commands entered by a user via input mechanisms 102 and 106, as described above. Information may be visually provided to the user via display 104.

During a conventional mode of operation, input mechanisms 102 and 106 are configured for conventional telephone functions. For example, input mechanism 102 could be a key on telephone 100 for entering data, such as digits corresponding to a telephone number, or input mechanism 106 could be a shuttle dial switch for controlling volume or navigating an electronic menu offered by display 104. Information pertaining to the electronic menu are stored in memory 216. Input mechanism 102 and 106 send an electronic signal to processor 214, which in turn controls any number of functional

elements to achieve a particular result, such as entering a telephone number and initiating a telephone call.

During a push-to-talk mode of operation, input mechanism 102, 106, or both are reconfigured to act like a push-to-talk switch on a push-to-talk communication device. A user can select a push-to-talk mode of operation using a series of inputs from input mechanism 102 and/or 106 in conjunction with an electronic menu provided by display 104. Alternatively, a push-to-talk mode could be entered by simply pressing a dedicated push-to-talk key, which, when depressed, reconfigures telephone 100 into a push-to-talk telephone.

After the push-to-talk mode of operation has been entered, one or more input mechanisms 102/106 are reconfigured to act as a push-to-talk switch. For example, after the push-to-talk mode of operation has been entered, input mechanism 106 could be preselected to act as a push-to-talk switch. In another embodiment, input mechanism 102 could be reconfigured to act as a push to talk switch. For example, a "1" key on telephone 100, used to enter the digit "1" during a conventional mode of operation of telephone 100, is reconfigured to act as a push-to-talk switch. To transmit audio information, i.e. speech, to one or more net members, a user of telephone 100 presses the "1" key and holds it for the duration of the transmission. Processor 214 receives an electrical signal from the preselected key, in this case the "1" key, signifying that the "1" key is being pressed. The electrical signal generally persists until the "1" key is released. During the time that the "1" key is pressed, processor 214 enables any audio information received by microphone 108 to be transmitted to one or more users. This can be done in any number of methods known in the art. For example, when processor 214 detects that the preselected key or keys is pressed, signals from microphone 108 are processed in much the same way as in the conventional telephone mode.

In addition, during the period when the "1" key is pressed, processor 214 may, in an alternative embodiment, disable speaker 212, using techniques well known in the art. Generally, in a push-to-talk mode of operation, a user's transmission is broadcast to all net members, including the user generating the transmission. It is undesirable to have a user's transmission broadcast back to that user while speaking. Therefore, processor 214 will generally disable speaker 212 while the push-to-talk switch is pressed.

When the push-to-talk switch is released, processor 214 detects the event by detecting a change in the electrical signal sent by the key or input mechanism 102/106 being released. In response to the release of the key, processor 214 disables audio information from being transmitted to other net members. Processor 214 may disable the audio information in one of several well known methods used in the art. For example, processor 214 could simply open a switch (not shown) located between microphone 108 and A/D 200, thereby preventing audio signals from being processed. Alternatively, processor 214 could alter the digitized audio signal at any point in the transmission path to represent a silent or near-silent state. Alternatively still, processor 214 could reduce the audio signal amplitude to a negligible level by reducing one or more amplifier gains from amplifiers located at or within microphone 108 or A/D 200. Generally, the signal from microphone 108 requires amplification to be processed by other functional components. This is normally accomplished by using one or more adjustable amplifiers.

In addition to disabling audio information from being transmitted, processor 214, in an alternative embodiment, re-enables speaker 110, if speaker 110 was disabled during the period of time that the push-to-talk switch was pressed. Again, processor 214 can use one of many well known techniques to re-enable speaker 110.

FIG. 3 illustrates a flow diagram of the method of the present invention. In step 300, a user selects a push-to-talk mode of operation for telephone 100. As described above, the push-to-talk mode of operation can be entered by pressing a dedicated key or switch, or it can be selected by selecting a push-to-talk mode of operation from an electronic menu using display 104.

In step 302, processor 214 reconfigures one or more input mechanisms to act as a push-to-talk switch. In the exemplary embodiment, input mechanism 106, comprising a shuttle dial switch, is reconfigured as the push-to-talk switch. However, any other input mechanism 102 on telephone 100 could alternatively, or in addition, be reconfigured to act as a push to talk switch. For example, the "2" key could be reconfigured as the push-to-talk switch.

The input mechanism(s) acting as a push-to-talk switch are chosen prior to loading memory 216 with programming instructions. The programming instructions comprise computer code which allows processor 214 to control the functionality of telephone 100. Generally, the

programming instructions are loaded into memory 216 during manufacture of telephone 100, and are not accessible to a user. However, in another embodiment, the programming instructions allow a user to select which key will be used as a push-to-talk switch. For example, after a user selects the 5 push-to-talk mode of operation, the next key that is pressed will be designated the push-to-talk switch by processor 214.

The previous description of the preferred embodiments is provided to enable any person skilled in the art to make or use the present invention. The various modifications to these embodiments will be readily apparent to 10 those skilled in the art, and the generic principles defined herein may be applied to other embodiments without the use of the inventive faculty. Thus, the present invention is not intended to be limited to the embodiments shown herein but is to be accorded the widest scope consistent with the principles and novel features disclosed herein.

15

**WE CLAIM:**

## CLAIMS

1. An apparatus for providing push-to-talk functionality to a  
2 conventional telephone, comprising:

4 an input mechanism located on said conventional telephone,  
6 configurable for use as a conventional telephone function while said  
conventional telephone is in a conventional telephone mode, and as a  
push-to-talk function while said conventional telephone is in a push-to-talk  
mode.

2. The apparatus of claim 1 wherein said conventional telephone  
function comprises a data entry function.

3. The apparatus of claim 1 wherein said conventional telephone  
function comprises a menu navigation function.

4. The apparatus of claim 1 wherein transmissions from said  
2 conventional telephone are enabled while said conventional telephone is in  
said push-to-talk mode and said shuttle dial is pressed.

5. The apparatus of claim 1 wherein said input mechanism  
2 comprises at least one preselected key located on said conventional  
telephone.

6. The apparatus of claim 1 further comprising input means for  
2 configuring said conventional telephone for said conventional telephone  
mode or said push-to-talk mode.

7. The apparatus of claim 1 further comprising:  
2 a electronic menu of options stored in a memory; and  
4 a display for presenting said menu of options, said menu of options  
comprising an option for entering said push-to-talk mode; and  
6 a processor for receiving commands from said input mechanism, for  
8 processing said commands in accordance with pre-stored programming  
instructions stored in said memory, and for enabling transmissions from  
said conventional telephone while said conventional telephone is in said  
push-to-talk mode and said input mechanism is pressed by a user.

8. The apparatus of claim 1 wherein said input mechanism is a  
2 preselected switch.

9. The apparatus of claim 1 wherein said input mechanism is a  
2 preselected key.

10. The apparatus of claim 1 wherein said input mechanism is  
2 chosen by a user after said push-to-talk mode has been entered.

11. A method for providing push-to-talk functionality to a  
2 conventional telephone, comprising the steps of:

selecting a push-to-talk mode of operation for said conventional  
4 telephone; and

reconfiguring an input mechanism located on said conventional  
6 telephone from a conventional telephone function to a push-to-talk switch.

12. The method of claim 11 wherein said conventional telephone  
2 function comprises entering data into said conventional telephone.

13. The method of claim 11 wherein said conventional telephone  
2 function comprises navigating an electronic menu.

14. The method of claim 11 wherein the step of selecting a push-to-  
2 talk mode of operation comprises:

displaying a menu of options, said menu of options including an  
4 option for entering said push-to-talk mode; and

selecting said push-to-talk mode.

15. The method of claim 11 wherein the step of selecting a push-to-  
2 talk mode of operation comprises:

displaying a menu of options, said menu of options including an  
4 option for entering said push-to-talk mode; and

selecting said push-to-talk mode using a second input mechanism.

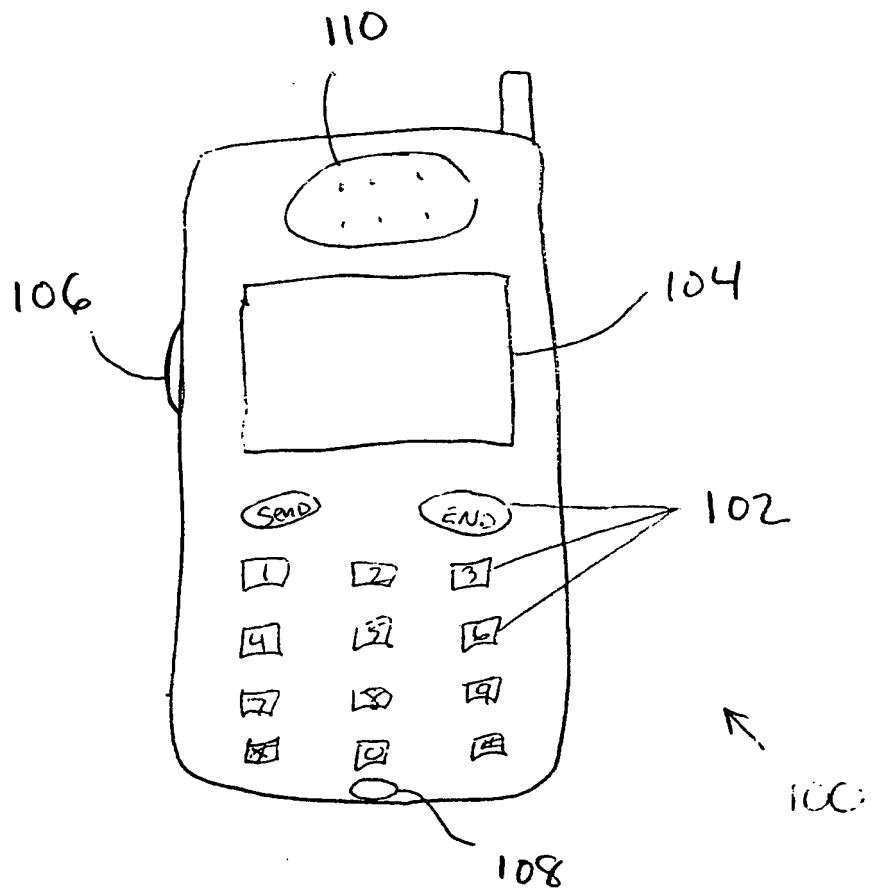
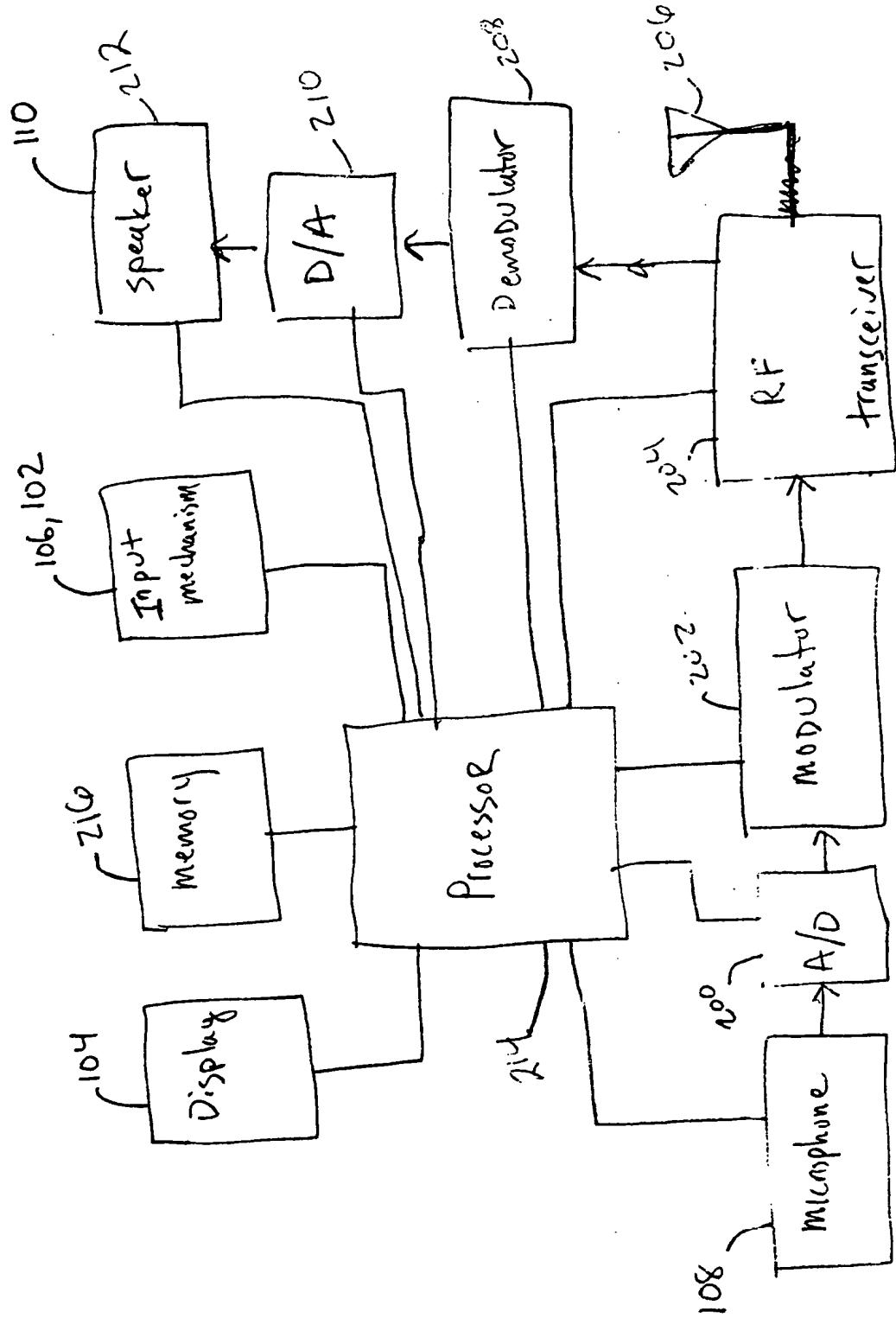


Fig 1.

Fig 2.



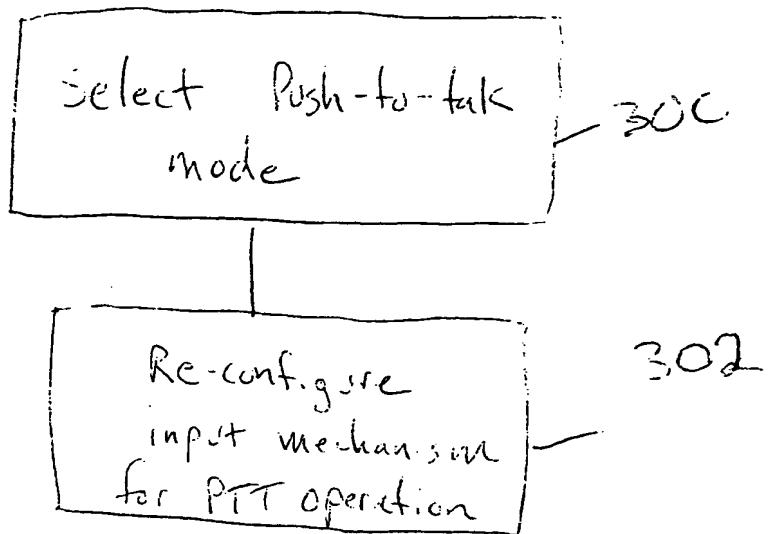


Fig 3

# INTERNATIONAL SEARCH REPORT

Intern al Application No

PCT/US 00/31806

**A. CLASSIFICATION OF SUBJECT MATTER**  
 IPC 7 H04M1/725 H04Q7/28 H04M1/247

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04M H04Q H04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, INSPEC, COMPENDEX

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 881 370 A (FORD ROBERT B ET AL) 9 March 1999 (1999-03-09) column 1, line 60 -column 3, line 39 -----	1-15

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

\* Special categories of cited documents :

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

- \*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- \*&\* document member of the same patent family

Date of the actual completion of the international search

11 April 2001

Date of mailing of the international search report

20/04/2001

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# INTERNATIONAL SEARCH REPORT

## Information on patent family members

International Application No

PCT/US 00/31806

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5881370 A	09-03-1999	GB 2318706 A	29-04-1998

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(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW.

(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

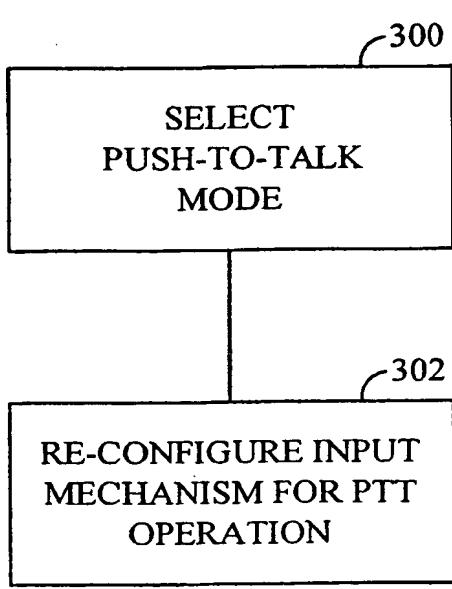
Published:  
— with international search report

(48) Date of publication of this corrected version:  
30 May 2002

(15) Information about Correction:  
see PCT Gazette No. 22/2002 of 30 May 2002, Section II

[Continued on next page]

(54) Title: SYSTEM AND METHOD FOR PROVIDING PUSH-TO-TALK FEATURE FOR WIRELESS COMMUNICATION SYSTEMS



(57) Abstract: A method and apparatus for providing push-to-talk functionality to a conventional telephone. An existing key or switch located on a conventional telephone is selected to act as a push-to-talk switch. When a push-to-talk mode of operation is entered, the preselected key or switch is reconfigured to act as a push-to-talk switch. When the preselected key or switch is pressed while the telephone is in the push-to-talk mode, transmission from the telephone is enabled, allowing a user to transmit information to one or more entities. Transmission generally occurs for as long as the preselected key or switch is pressed. When the preselected key is released, the telephone is disabled from transmitting information.

WO 01/37526 A1



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Push-to-talk communications are becoming increasingly popular. However, a special wireless telephone having a push-to-talk switch must be purchased for use in group communication systems. Often, users already own one or more conventional wireless communication devices. 5 Therefore, it would be desirable for such users to convert their conventional telephones into a push-to-talk capable device, without having to incur the expense of purchasing a telephone with such capabilities.

## SUMMARY OF THE INVENTION

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The present invention is a method and apparatus for providing push-to-talk functionality to a conventional telephone. In an exemplary embodiment, an existing key or switch located on a conventional telephone is preselected to act as a push-to-talk switch. During a push-to-talk mode of 15 operation, when the preselected key or switch is pressed, transmission from the telephone is enabled, allowing a user to transmit information to one or more users. Transmission generally occurs for as long as the preselected key or switch is pressed. When the preselected key is released, the telephone is disabled from transmitting information.

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Push-to-talk functionality is realized by enabling a push-to-talk mode on the telephone. In the exemplary embodiment, this is accomplished by accessing a menu on a telephone display using one or more existing keys or switches located on the telephone housing. When the push-to-talk mode has been entered, at least one preselected key or switch is reconfigured to act 25 as a push-to-talk switch. In a conventional telephone mode, the preselected key or switch is configured to operate a different function than the push-to-talk function which is enabled during the push-to-talk mode.

## BRIEF DESCRIPTION OF THE DRAWINGS

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FIG. 1 illustrates a conventional telephone incorporating a preferred embodiment of the present invention;

FIG. 2 illustrates a functional block diagram detailing the functional components of the conventional telephone of FIG. 1; and

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FIG. 3 is a flow diagram detailing the method of the present invention.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

5 The embodiments described herein are described with respect to a wireless communication device, specifically a wireless telephone. While the present invention is especially suited for the transmission of voice information using such a wireless telephone, it should be understood that the present invention may be employed in various other types of  
10 applications, such as the transmission of audio, video, and data using such devices as landline telephones, satellite telephones, computers, and various video devices.

15 FIG. 1 illustrates a conventional wireless telephone 100 as used in the preferred embodiment of the present invention. Interface mechanisms, or keys, 102 allow a user to interface with telephone 100, while display 104 allows the user to monitor the status and operation of telephone 100. For example, to place a conventional telephone call, that is, a call from one user to another user, a telephone number is typically entered into telephone 100 by a first user pressing keys 102 corresponding to the desired telephone  
20 number corresponding to a second user. Display 104 typically displays an integer corresponding to each key 102 that is pressed. After the desired telephone number has been entered into telephone 100, a key is pressed to initiate the call, shown in FIG. 1 as a "send" key. Audio information, typically in the form of human speech, is received by microphone 108 while  
25 audio information from the second user is broadcast through speaker 110.

30 Many wireless telephones today have at least one interface mechanism 106 located on a side of telephone 100 for controlling various functions related to the operation of telephone 100. For example, interface mechanism 106 may comprise a rocker switch, rotatable dial, or shuttle dial to control an electronic menu which can be displayed on display 104. Interface mechanism 106, in combination with the electronic menu, and/or other interface mechanisms 102, allows a user to control various functions of telephone 100, such as ringer type and volume, various security features, display features, operational features, voice mail features, and so on.

35 In accordance with a preferred embodiment of the present invention, at least one interface mechanism 102, 106, or both, are reconfigured to enable a push-to-talk function when a push-to-talk mode of operation is chosen. An additional menu selection is added to the electronic menu to allow a

user to choose a push-to-talk mode of operation. When the push-to-talk mode of operation is selected, the one or more interface mechanisms are reconfigured to act as a push-to-talk switch.

A push-to-talk mode of operation, otherwise known as group mode, 5 one-to-many mode, or net broadcast mode, typically allows a user to listen to one or more members of a communication net. A communication net is a defined list of people who are able to communicate simultaneously with each other, generally through a central station of some kind. The communication net may be predetermined, or it may be allow users to join 10 and leave the net at will. Each net member uses a push-to-talk capable telephone to transmit information to other net members. The net can be regulated or unregulated. In a regulated net, only one net member can transmit at any given time. Permission to transmit is granted generally by a central communication manager. In an unregulated net, otherwise known 15 as a conference bridge, more than one member may transmit to other net members at any given time, however, this often results in unintelligible reception to the users due to the interference between multiple simultaneous transmissions.

FIG. 2 is a functional block diagram of telephone 100 in accordance 20 with the teachings of the present invention. The functional blocks are shown for illustrative purposes to explain the present invention and, therefore, many of the other functions of a wireless telephone, which are well known in the art, have been omitted for clarity. Although FIG. 2 illustrates the basic functional elements of a wireless digital telephone, the 25 present invention is not intended to be limited to a wireless telephone, or to a specific modulation scheme, protocol, or standard.

Referring back to FIG. 2, during conventional operation of telephone 100, acoustic energy, most often in the form of human speech, is received by microphone 108, where it is converted into electrical energy in the form of 30 an analog waveform and provided to analog-to-digital (A/D) converter 200. A/D 200 receives the analog waveform and converts it into a digital representation, often in the form of a pulse coded modulated (PCM) digital signal. The digital signal is then provided to modulator 202, where the digital signal is modulated in accordance with the particular type of 35 transmission scheme in use. For example, modulator 202 could be a CDMA modulator, a TDMA modulator, an AMPS modulator, or any other modulator known in the art. The modulated digital signal is then provided

to RF transceiver 204, where it is upconverted to a very high frequency for transmission through antenna 206.

Transmissions to telephone 100 are received by antenna 206 and provided to RF transceiver 204 where the transmission is downconverted from a very high frequency to an intermediate frequency. The downconverted signal is then provided to demodulator 208, where the information signal, in digital form, is extracted from the signal provided by RF transceiver 204. The digitized information signal is then provided to digital-to-analog (D/A) converter 210, where the digitized signal is converted into an analog signal, suitable for speaker 212. Speaker 212 converts the analog electrical signal into acoustic energy which may be heard by a user. The audio output level from speaker 212 is typically only audible by placing speaker 212 in proximity to the user's ear. However, other speakers are available which broadcast audio information at much greater level so that the user can hear the audio information even if speaker 212 is not in direct proximity to the user's ear. In an alternative embodiment, telephone 100 could comprise two speakers 212, one for use during conventional telephone operation, where audio information is broadcast a relatively low output level, and another for use during a push-to-talk mode of operation, where audio information is broadcast at a relatively high output level.

The functions of the various blocks shown in FIG. 2 are generally coordinated by processor 214, although other configurations are certainly possible. Processor 214 is a generally a well-known digital computing device used in connection with a set of program instructions pre-stored in memory 216. Processor 214 generally controls the functions of each block shown in FIG. 2, although each functional element could have its own processor, memory, and instruction set for performing specific operations of telephone 100. Processor 214 is controlled by commands entered by a user via input mechanisms 102 and 106, as described above. Information may be visually provided to the user via display 104.

During a conventional mode of operation, input mechanisms 102 and 106 are configured for conventional telephone functions. For example, input mechanism 102 could be a key on telephone 100 for entering data, such as digits corresponding to a telephone number, or input mechanism 106 could be a shuttle dial switch for controlling volume or navigating an electronic menu offered by display 104. Information pertaining to the electronic menu are stored in memory 216. Input mechanism 102 and 106 send an electronic signal to processor 214, which in turn controls any number of functional

elements to achieve a particular result, such as entering a telephone number and initiating a telephone call.

During a push-to-talk mode of operation, input mechanism 102, 106, or both are reconfigured to act like a push-to-talk switch on a push-to-talk communication device. A user can select a push-to-talk mode of operation using a series of inputs from input mechanism 102 and/or 106 in conjunction with an electronic menu provided by display 104. Alternatively, a push-to-talk mode could be entered by simply pressing a dedicated push-to-talk key, which, when depressed, reconfigures telephone 100 into a push-to-talk telephone.

After the push-to-talk mode of operation has been entered, one or more input mechanisms 102/106 are reconfigured to act as a push-to-talk switch. For example, after the push-to-talk mode of operation has been entered, input mechanism 106 could be preselected to act as a push-to-talk switch. In another embodiment, input mechanism 102 could be reconfigured to act as a push to talk switch. For example, a "1" key on telephone 100, used to enter the digit "1" during a conventional mode of operation of telephone 100, is reconfigured to act as a push-to-talk switch. To transmit audio information, i.e. speech, to one or more net members, a user of telephone 100 presses the "1" key and holds it for the duration of the transmission. Processor 214 receives an electrical signal from the preselected key, in this case the "1" key, signifying that the "1" key is being pressed. The electrical signal generally persists until the "1" key is released. During the time that the "1" key is pressed, processor 214 enables any audio information received by microphone 108 to be transmitted to one or more users. This can be done in any number of methods known in the art. For example, when processor 214 detects that the preselected key or keys is pressed, signals from microphone 108 are processed in much the same way as in the conventional telephone mode.

In addition, during the period when the "1" key is pressed, processor 214 may, in an alternative embodiment, disable speaker 212, using techniques well known in the art. Generally, in a push-to-talk mode of operation, a user's transmission is broadcast to all net members, including the user generating the transmission. It is undesirable to have a user's transmission broadcast back to that user while speaking. Therefore, processor 214 will generally disable speaker 212 while the push-to-talk switch is pressed.

When the push-to-talk switch is released, processor 214 detects the event by detecting a change in the electrical signal sent by the key or input mechanism 102/106 being released. In response to the release of the key, processor 214 disables audio information from being transmitted to other net members. Processor 214 may disable the audio information in one of several well known methods used in the art. For example, processor 214 could simply open a switch (not shown) located between microphone 108 and A/D 200, thereby preventing audio signals from being processed. Alternatively, processor 214 could alter the digitized audio signal at any point in the transmission path to represent a silent or near-silent state. Alternatively still, processor 214 could reduce the audio signal amplitude to a negligible level by reducing one or more amplifier gains from amplifiers located at or within microphone 108 or A/D 200. Generally, the signal from microphone 108 requires amplification to be processed by other functional components. This is normally accomplished by using one or more adjustable amplifiers.

In addition to disabling audio information from being transmitted, processor 214, in an alternative embodiment, re-enables speaker 110, if speaker 110 was disabled during the period of time that the push-to-talk switch was pressed. Again, processor 214 can use one of many well known techniques to re-enable speaker 110.

FIG. 3 illustrates a flow diagram of the method of the present invention. In step 300, a user selects a push-to-talk mode of operation for telephone 100. As described above, the push-to-talk mode of operation can be entered by pressing a dedicated key or switch, or it can be selected by selecting a push-to-talk mode of operation from an electronic menu using display 104.

In step 302, processor 214 reconfigures one or more input mechanisms to act as a push-to-talk switch. In the exemplary embodiment, input mechanism 106, comprising a shuttle dial switch, is reconfigured as the push-to-talk switch. However, any other input mechanism 102 on telephone 100 could alternatively, or in addition, be reconfigured to act as a push to talk switch. For example, the "2" key could be reconfigured as the push-to-talk switch.

The input mechanism(s) acting as a push-to-talk switch are chosen prior to loading memory 216 with programming instructions. The programming instructions comprise computer code which allows processor 214 to control the functionality of telephone 100. Generally, the

programming instructions are loaded into memory 216 during manufacture of telephone 100, and are not accessible to a user. However, in another embodiment, the programming instructions allow a user to select which key will be used as a push-to-talk switch. For example, after a user selects the 5 push-to-talk mode of operation, the next key that is pressed will be designated the push-to-talk switch by processor 214.

The previous description of the preferred embodiments is provided to enable any person skilled in the art to make or use the present invention. The various modifications to these embodiments will be readily apparent to 10 those skilled in the art, and the generic principles defined herein may be applied to other embodiments without the use of the inventive faculty. Thus, the present invention is not intended to be limited to the embodiments shown herein but is to be accorded the widest scope consistent with the principles and novel features disclosed herein.

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**WE CLAIM:**

## CLAIMS

1. An apparatus for providing push-to-talk functionality to a  
2 conventional telephone, comprising:

an input mechanism located on said conventional telephone,  
4 configurable for use as a conventional telephone function while said  
conventional telephone is in a conventional telephone mode, and as a  
6 push-to-talk function while said conventional telephone is in a push-to-talk  
mode.

2. The apparatus of claim 1 wherein said conventional telephone  
2 function comprises a data entry function.

3. The apparatus of claim 1 wherein said conventional telephone  
2 function comprises a menu navigation function.

4. The apparatus of claim 1 wherein transmissions from said  
2 conventional telephone are enabled while said conventional telephone is in  
said push-to-talk mode and said shuttle dial is pressed.

5. The apparatus of claim 1 wherein said input mechanism  
2 comprises at least one preselected key located on said conventional  
telephone.

6. The apparatus of claim 1 further comprising input means for  
2 configuring said conventional telephone for said conventional telephone  
mode or said push-to-talk mode.

7. The apparatus of claim 1 further comprising:  
2 a electronic menu of options stored in a memory; and  
4 a display for presenting said menu of options, said menu of options  
comprising an option for entering said push-to-talk mode; and  
6 a processor for receiving commands from said input mechanism, for  
processing said commands in accordance with pre-stored programming  
instructions stored in said memory, and for enabling transmissions from  
8 said conventional telephone while said conventional telephone is in said  
push-to-talk mode and said input mechanism is pressed by a user.

8. The apparatus of claim 1 wherein said input mechanism is a  
2 preselected switch.

9. The apparatus of claim 1 wherein said input mechanism is a  
2 preselected key.

10. The apparatus of claim 1 wherein said input mechanism is  
2 chosen by a user after said push-to-talk mode has been entered.

11. A method for providing push-to-talk functionality to a  
2 conventional telephone, comprising the steps of:

selecting a push-to-talk mode of operation for said conventional  
4 telephone; and

reconfiguring an input mechanism located on said conventional  
6 telephone from a conventional telephone function to a push-to-talk switch.

12. The method of claim 11 wherein said conventional telephone  
2 function comprises entering data into said conventional telephone.

13. The method of claim 11 wherein said conventional telephone  
2 function comprises navigating an electronic menu.

14. The method of claim 11 wherein the step of selecting a push-to-  
2 talk mode of operation comprises:

displaying a menu of options, said menu of options including an  
4 option for entering said push-to-talk mode; and

selecting said push-to-talk mode.

15. The method of claim 11 wherein the step of selecting a push-to-  
2 talk mode of operation comprises:

displaying a menu of options, said menu of options including an  
4 option for entering said push-to-talk mode; and

selecting said push-to-talk mode using a second input mechanism.

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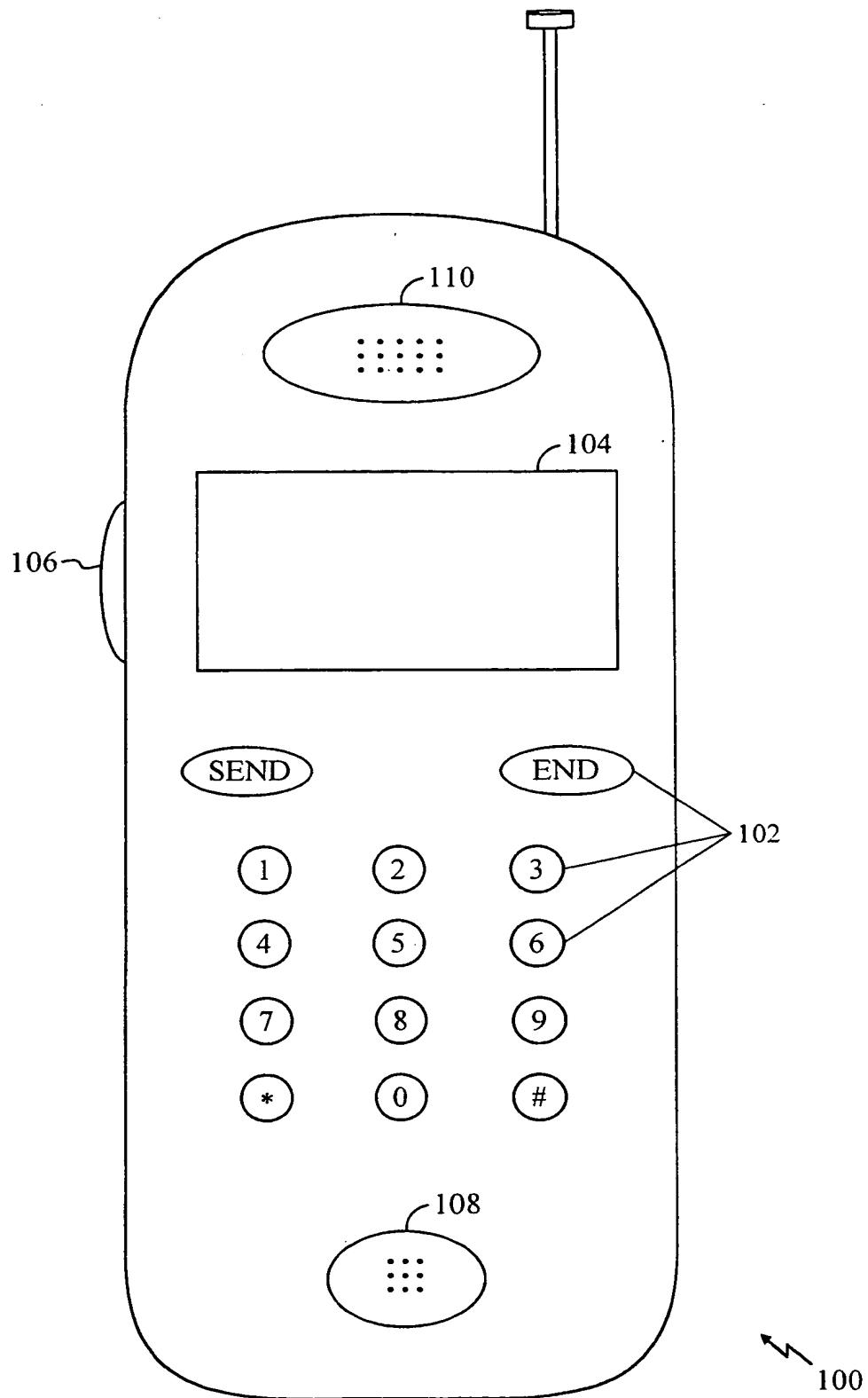


FIG. 1

**SUBSTITUTE SHEET (RULE 26)**

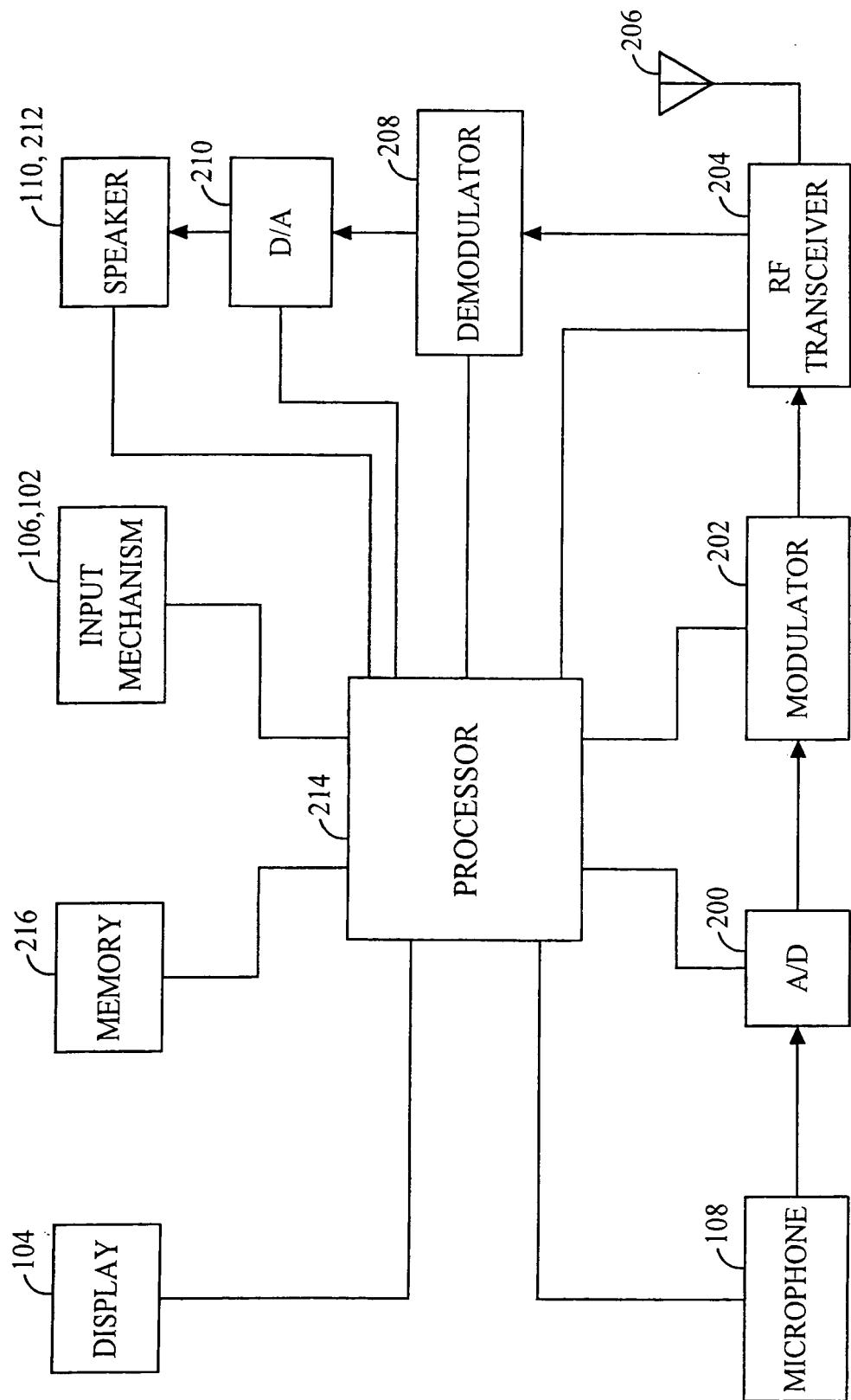


FIG. 2

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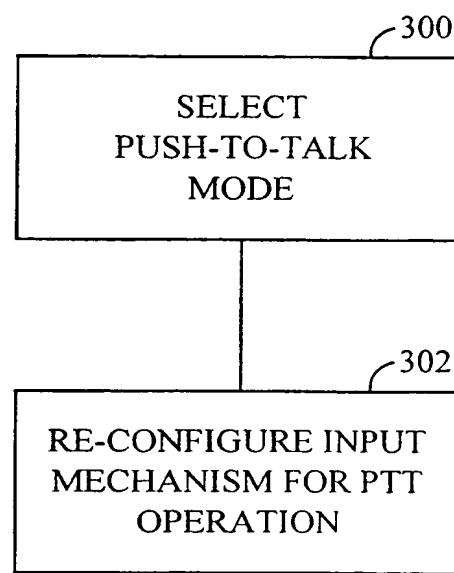


FIG. 3

**SUBSTITUTE SHEET (RULE 26)**

# INTERNATIONAL SEARCH REPORT

Internatinal Application No

PCT/US 00/31806

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC 7 H04M1/725 H04Q7/28 H04M1/247

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04M H04Q H04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, INSPEC, COMPENDEX

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 881 370 A (FORD ROBERT B ET AL) 9 March 1999 (1999-03-09) column 1, line 60 -column 3, line 39 -----	1-15

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

Special categories of cited documents :

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

- \*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- \*&\* document member of the same patent family

Date of the actual completion of the international search

11 April 2001

Date of mailing of the international search report

20/04/2001

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# INTERNATIONAL SEARCH REPORT

## Information on patent family members

Internatinal Application No

PCT/US 00/31806

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5881370 A	09-03-1999	GB 2318706 A	29-04-1998

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